The official voice of the Air Force Research Laboratory
news@afrl
Features
September 2006

Five-minute mission features five pioneering payloads

by Michael P. Kleiman, AFRL Space Vehicles Directorate

KIRTLAND AIR FORCE BASE, N.M. — The Re-Entry Structures Experiment (RESE), a hypersonic vehicle consisting of five ground-breaking payloads, will reach a projected altitude of 275,000 feet at Mach 5 (five times the speed of sound or 3,800 miles per hour) before descending to the desert in two pieces more than 45 miles north of the lift-off site.

The vehicle is scheduled to launch from White Sands Missile Range, N.M., in December, on a U.S. Navy-supplied rocket.

Designed and developed by the Air Force Research Laboratory's Space Vehicles Directorate, Kirtland Air Force Base, N.M., the RESE project serves as a low-cost approach to flight testing hardware and experiments, which will be included on future NASA space exploration missions and Air Force satellites.

"The Re-Entry Structures Experiment is important because it combines six very different experiments into a single vehicle in order to maximize the payoff," said Andy Williams, RESE program manger from AFRL's Space Vehicles Directorate. "It also represents an excellent opportunity for our junior workforce to get flight and project experience."

Re-Entry Structures Experiment Program Manager Andy Williams inspects the two sections comprising the five-minute trial flight, scheduled to launch from White Sands Missile Range, N.M., in December 2006. (Air Force photo by Michael P. Kleiman)

Experiments onboard the inaugural RESE flight include a new acoustic protection system, the first flight of a re-configurable hardware architecture for responsive satellites, two novel thermal sensors, a new high temperature material, and a flexible circuitry experiment. The acoustic test will measure the performance of the Hybrid Acoustically Layered Foil (HALF) foam treatment, which is used to line the inside of the rocket structure to reduce noise in the launch vehicle that might damage sensitive instruments.

The Responsive Space Bus Demonstration (RSBD) will demonstrate a new, re-configurable hardware architecture, similar to the Plug-and-Play concept used on desktop computers, to quickly assemble satellites to meet changing mission needs. The two thermal sensors, provided by NASA, will be employed on the Crew Exploration Vehicle, the proposed successor to the Space Shuttle program. The high temperature material developed by Ocellus Inc., San Carlos, Calif., will be evaluated in protecting the reentry vehicle. Finally, a thin, flexible circuitry, supplied by Q Flex Inc., Santa Anna, Calif., will be assessed for future employment in satellites, missiles and aircraft. This new flexible cable promises to reduce the mass of aerospace cabling by over 50 percent.

"RESE is a very exciting project because team members have the opportunity to participate from the concept stage to actual flight. In addition, we are performing an actual mission," Mr. Williams said. "The project goal is to conduct another RESE test flight, operating at speeds between Mach 10 and 12 (7,600 to 9,120 miles per hour), within another year, featuring new experiments."

During the 300-second flight, data will be collected at various intervals from the five experiments. Then, once the flight concludes, project personnel will search a two to three square mile area of the southern New Mexico desert for parts of the RESE vehicle's experiments that survived the hypersonic flight. They will be specifically looking for the nose cone, which houses the NASA sensors and a recoverable data recorder.

The RESE's flight experiment, funded by the Space Test Program, Space and Missile Systems Center, Los Angeles Air Force Base, Calif., and AFRL will ultimately benefit the warfighter. For example, the HALF experiment will exhibit technology to protect sensitive satellite components from the harsh launch environment. If successful, the apparatus will prevent

continued on page 2

continued from page 1

damage to satellites during launch, as well as increase flight opportunities and augment payload weight. In addition, the RSBD trial will confirm the potential of quickly assembling components to achieve a specific mission objective.

"RESE is unique in that we are looking for different experiments that validate warfighter needs in multiple areas," said Mr. Williams, who has served on the project since May 2003, five months after its inception. "We are looking for ways to increase the amount of payloads to put in orbit, as well as how quickly we can do it. I believe the RESE program will achieve both." **@**